Examining FAMU's supply of teachers: a value-added analysis of college of preparation on pupil academic achievement

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2010

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June 10, 2010

Abstract: Some teacher preparation institutions may provide higher quality teachers than others. Pupil academic achievement is one measure of the quality of teaching. Standardized test scores, e.g., the Florida Comprehensive Assessment Tests (FCAT), provide a measure of pupil academic achievement. This study seeks to ascertain whether Florida Agricultural & Mechanical University (FAMU) has a "college preparation effect" on the average pupil's FCAT reading and mathematics scores. We find that the quality of FAMU's teachers is statistically indistinguishable from the quality of teachers prepared by all other public colleges and universities in the state of Florida. This appears to be a robust conclusion. Our results are roughly the same regardless of whether we confine the sample to pupils matched with traditionally trained teachers (college of education graduates), all teachers, all traditionally trained African American teachers, or all African American teachers.

JEL codes: I2, J15, J44, J45, J48

Key words: teacher quality, value-added model, historically black colleges and universities, HBCU, teacher productivity, education and value-added

I thank the staff of the Florida PK-20 Education Data Warehouse for their assistance in obtaining and interpreting the data used in this study. All errors, omissions, opinions, and conclusions expressed herein are solely the author's and do not necessarily reflect the opinions of the Florida Department of Education and its subsidiary administrative units.

Do some teacher preparation institutions provide higher quality teachers than others? Many states have adopted measures that hold colleges of education accountable for the quality of their graduates in public school settings, even though alternative means of acquiring teacher certifications and teaching positions are varied. Pupil academic achievement is one measure of the quality of teaching. Standardized test scores, e.g., the Florida Comprehensive Assessment Tests (FCAT), provide a measure of pupil academic achievement. Accordingly, this study seeks to ascertain whether Florida Agricultural & Mechanical University (FAMU) has a "college preparation effect" on the average pupil's FCAT reading and mathematics scores.

FAMU is the sole public Historically Black University or College within the state of Florida. It's graduates represent a disproportionate proportion of teachers of low income and African American pupils, that is, pupils with lower than average FCAT scores. When controlling for a large number of other important variables, will pupils taught by college of education graduates of FAMU have higher or lower FCAT scores than otherwise identical pupils taught by teacher preparation program graduates of the University of Florida, University of South Florida, Florida State University, or other teacher preparation programs?

This study uses a value-added regression model to establish the relative effectiveness of teacher education in Florida. We find that value-added regression analysis fails to uncover robust and substantive differences among teacher preparation programs. Regardless of pupil race (African American, Hispanic, or white), gender, or academic subject (mathematics or reading), the academic achievement of pupils taught by FAMU prepared teachers more or less equals the academic achievement of pupils taught by teachers prepared at Florida's other universities.

I. Pupil academic achievement and Florida's supply of new teachers: institutional context

Florida Comprehensive Assessment Test

The Florida Comprehensive Assessment Test (FCAT) is a criterion-based examination established by the State of Florida, used to assess learning effectiveness in reading and mathematics, for pupils in grades 3 – 10. The FCAT tests student mastery at each grade level and yields developmental scale scores for the Sunshine State standards. School accountability, teacher pay and promotion, and student graduation criteria are based on the FCAT developmental scale scores.

Based on the developmental scale scores, student achievement on the FCAT is assigned an ordinal rank of 1 – 5. Level 1 and 2 are the lowest levels of achievement, signifying minimal or limited grade-level content. Achievement level 3 (the lowest level consistent with proficient achievement) signifies that performance is on grade-level, students are at least partly successful with grade-level content. Levels 4 and 5 indicate that students are mostly successful or completely successful with the most challenging grade-level content.

A pupil is deemed to have made an annual learning gain when one of the following conditions hold: i) there is improvement on the achievement level over the previous year; or, ii) the student has maintained a proficient achievement level on FCAT relative to the previous year; or, iii) pupil remained within FCAT achievement levels 1 or 2 but demonstrated more than 1 year's growth on the FCAT development scale score (Florida Department of Education, 2010b). The later method is not applicable for pupils retained at the same grade level, persons whose who declined a grade level, or pupils who are 2 or more grade levels higher than the previous year; for these pupils, learning gains are accessed according to method i) or ii). If a pupil's FCAT achievement level declines from one year to the next, the pupil is not deemed to have made an annual learning gain.

Teacher preparation

The State University System of Florida, private universities and colleges, and other public and private institutions supply new teachers to Florida's public school's through 1 of 4 paths: 1) initial teacher preparation program (ITP); 2) alternative certification in an educator preparation institute (EPI); 3) alternative certification program in school district (DAC); and, professional training option (PTO) for non-education majors. ITP completers are graduates of the State University System of Florida (11 public universities), the Florida College System (community colleges), and independent colleges and universities. All State University System institutions are ITP participants. Chipola College, Miami-Dade College, and St. Petersburg College are the only Florida College System institutions with an ITP, but 27 Florida College System institutions have an EPI. Eighteen of Florida's independent colleges and universities have an ITP.

ITP programs provide the traditional route for entering the teaching profession. Individuals must demonstrate general and subject knowledge, along with mastery of professional preparation and education competence. ITP program completers are qualified for a Professional Certification upon program completion. Often, ITP program completers will have completed one or more years of teaching at the point of program completion.

Colleges and universities offering ITP programs "are also authorized to offer an approved Professional Training Option (many times delivered as a minor in education) to degree seekers outside of the college of education or as a post-baccalaureate program of study (Milton, et al., 2008:2)." PTO teachers enter the profession by completing all the education courses required for professional preparation, along with obtaining a subject area bachelor's degree outside of the college of education. The PTO is design for undergraduate students in a discipline where there is a Florida Department of Education certification, but where the college or university does not

offer the disciplinary specialty within the college of education. For example, FAMU's College of Education has decided to offer the PTO only for disciplines such as journalism, agriculture, etc.

EPIs are also managed by Colleges of Education. Certification via EPI differs from PTO in that the EPI is a program designed for individuals who currently hold a degree in another field; but wish to enter into education. EPI individuals enter the teaching profession by demonstrating mastery of professional preparation and education competence.

Colleges of Education are not involved in DAC programs. Each local school district manages its own DAC, though each program is approved by the Florida Department of Education. The district programs generally serve bachelor's degree holders hired to teach with a Temporary Certificate. According to Milton, et al. (2008:3), "These programs [DAC and EPI] were conceived to help primarily with critical shortage areas in secondary education where a content major in the areas of arts and sciences could be paired with intense pedagogical training to move teachers without delay into the classroom with the tools they need to become effective."

During 2003-2004, 71 percent, 19 percent, and 10 percent of individuals completing a Florida teacher preparation program were graduates of public universities of Florida, independent colleges and universities of Florida, DAC programs, respectively (Florida Department of Education, 2009b). For 2006-2007, the supply shares were public universities (54 percent), independent colleges and universities (16 percent), DAC programs (18 percent), EPI programs (9 percent), and public colleges (3 percent).

Fifty-five percent and 53 percent of EPI and ITP program completers, respectively, go on to enter teaching but 87 percent of DAC program completers enter into the teaching profession (Florida Department of Education, 2010). Among all program completers of 2007-2008, 65 percent were ITP program completers, 19 percent were DAC program graduates, and 16 EPI

program graduates. Among all program completers of 2007-2008 who were employed as a teacher during 2008-2009, 58 percent were ITP program completers, 28 percent were DAC program graduates, and 14 EPI program graduates.

Measured by the percentage of pupils with at least 50 percent learning gains, there appears to be little difference in the effectiveness of ITP, DAC, and EPI programs (Table 1).

[Insert Table 1]

According to the Florida Department of Education (2009a), 64 percent of FAMU ITP completers had 50 percent of their pupils make learning gains during 2007-2008.

State University System of Florida

The State University System of Florida consists of 11 public universities differing in size, scope, and student demographics, disbursed throughout the state's population centers (Table 2). New College of Florida is a small liberal arts institution, classified as a Baccalaureate College by the Carnegie Foundation. It does not have a College of Education. Florida Gulf Coast University (FGCU) and the University of North Florida (UNF) are Master's Colleges and Universities (Larger Programs). FGCU does not have offer tenure to its faculty nor does its College of Education offer a doctoral degree.

Florida A & M University (FAMU) and the University of West Florida (UWF) are medium size universities classified as Doctoral/Research Universities. UWF and FAMU offer a Doctor of Education and a Doctor of Philosophy, respectively, in educational leadership.

Florida Atlantic University (FAU) and University of Central Florida (UCF) are Research Universities - High Research Activity. Both offer Doctor of Education and Doctor of Philosophy degrees. FAU has an EPI, while UCF has a PTO program.

Florida State University, University of Florida, University of South Florida, and Florida International University are Research Institutions - Very High Research Activity. Each offers multiple doctoral degrees. The US News and World Report shows that the University of Florida's College of Education has nationally ranked graduate academic programs: Counselor Education (No. 3), Special Education (5) and Educational Administration (26). "Overall, the college ranks 54th nationally and 25th among public education institutions in the elite Association of American Universities (http://www.coe.ufl.edu/)."

[Insert Table 2]

Florida A & M University

Florida Agricultural & Mechanical University (FAMU) and Florida International University (FIU) represent Florida's two public minority serving institutions. FAMU is one of the largest and most prominent Historically Black College or University in the country. Florida International University (FIU) has obtained a reputation as the country's premiere Hispanic serving institution. FIU ranks first in the nation among four-year colleges for awarding bachelor's and master's degrees to Hispanic students (Hispanic Outlook in Higher Education Magazine, 2009). Ninety-two percent of FAMU's students are African American, while 58 percent of FIU's students are Hispanic. Thirteen percent of FIU's students are African American, but just 2 percent of FAMU's students are Hispanic.

Eighteen percent and 16 percent of Florida Atlantic University's (FAU) students are African American and Hispanic, respectively. Other than the FAMU and FIU, FAU has the largest proportion of African American and Hispanic students. Florida Gulf Coast University (FGCU), University of Central Florida (UCF), and the University of Florida (UF) have the

smallest fractions of African American and Hispanic students, 5 percent and 10 percent, 8 percent and 13 percent, and 8 percent and 11 percent, respectively.

Nationally, Historically Black Colleges and Universities (HBCUs) account for 27.3 percent of African Americans graduating with a bachelor's degree in education, 30.2 percent of African American male graduates in education and 26.3 percent of African American female graduates in education (Provasnik and Shafter, 2004, Table A – 22).

Robinson and Albert (2008) argue that teacher education programs of Historically Black Colleges and Universities have an institutional advantage in the production of teachers. An important element of FAMU's institutional advantage lies in its ability to retain freshmen and sophomores. FAMU is the only SUS institution permitted to offer remedial coursework. Relative to other SUS institutions, FAMU admits students who have had more restricted opportunities, but FAMU does an excellent job providing the necessary remedial assistance required to move restricted opportunity students to graduation.[1]

For example, the graduation rate at FAMU for Associate of Arts transfer students is 68.3 percent, roughly equivalent to the average for the entire State University System (70.4 percent), but higher than the rate at 7 other institutions, and close to FSU's rate of 70.4 percent, though clearly less than UF's rate of 79.2 percent (Florida Department of Education, 2004, Figure 6). But, just 36.9 percent of FAMU's students graduate within 115 percent of degree requirement semester hours – the lowest rate within the State University System (Florida Department of Education, 2004, Figure 10). Even when we restrict our attention to first time in college students, just 37.4 percent of FAMU students graduate within 115 percent of degree requirement hours, which, again is the lowest in the state and close only to Florida International University's rate of 43.5 percent for first time in college students.

Twenty-six percent of students admitted to FAMU are profile assessment students (Florida Department of Education, 2004, Figure 33). Profile assessment students are not necessarily persons of lesser ability, but are likely to have had restricted educational opportunities. Examples of profile assessment students include: students who have the necessary grades and test scores but lack one unit of foreign language, students who have appropriate grades and coursework but lower than desired standardized test scores, students with extracurricular talents but insufficient grades and test scores. Only 5.3 percent of all SUS students are profile assessment students. No other university in the state system has more than 10 percent profile assessment students, with Florida Gulf Coast University placing a distant second to FAMU with 8.0 percent. By contrast, only 1.0 and 0.4 percent of the students at the University of Florida and Florida State University, respectively, are profile assessment students.

An important element of FAMU's success at retaining and graduating restricted opportunity students includes an extraordinary faculty commitment to teaching, especially to lower level undergraduates. Among all SUS institutions, students may be taught by regular faculty members, graduate assistants, faculty adjuncts, or other (non-faculty) instructional personnel. At FAMU, 70.4 percent of lower level undergraduate courses are taught by regular faculty, as opposed to 41.9 percent in the entire State University System (Florida Department of Education, 2004, Figure 20). FAMU's rate is exceeded only by the New College of Florida (91.5 percent). At FAMU, 74.3 percent of upper level undergraduate courses are taught by regular faculty, as opposed to 65.5 percent in the entire State University System. New College of Florida, Florida Gulf Coast University, and University of North Florida have higher rates at 92.3, 77.8, and 77 percent, respectively. This fact is significant because it supports the premise that FAMU may have an institutional advantage in producing teachers.

FAMU's value added has not gone unnoticed by families outside of the state of Florida. The state of Florida has set an undergraduate enrollment target of 10 percent out-of-state enrollment for the universities of the State University System. For the years that the state has collected data, 2001-02, 2002-03, and 2003-04, the state has not reached its target. From 2001-02 to 2003-04, out-of-state enrollment has declined from 8.6 percent to 7.5 percent (Florida Department of Education, 2004, Figure 28). FAMU is different. More than 1 of every 5 FAMU undergraduates (21.1 percent) is an out-of-state student. New College of Florida has a similar rate at 23.5 percent; otherwise, Florida State University is closest to FAMU with 10.3 percent of students coming from out-of-state. Out-of-state students provide a net cash injection into the state's economy; hence, a rising fraction of out-of-state students means that the state is competitively exporting education to the rest of the nation and the rest of world. Just 17.6 percent of FAMU's profile assessment students are from out-of-state (Florida Department of Education, 2004, Figure 37), which is close to the SUS average of 14.1 percent. An implication of this data is that FAMU has a competitive advantage in attracting students from out-of-state who require little remediation.

II. Model

Equation (1) states that pupil academic achievement ($FCAT_{ijkt}$) for pupil i, with teacher trained at institution j, enrolled in school k, during year t is a function of pupil ability and prior learning ($FCAT_{i,t-1}$), teacher preparation program ($FAMU_{it}$), pupil grade level ($Grade_{it}$), teacher characteristics (T), additional pupil characteristics (C), school fixed effects (S), and ε is a random error term.

$$(1)\ A_{ijkt} = \beta_0 + \alpha A_{i,t-1} + \beta_1 FAMU_{it} + \beta_2 Grade_{it} + T_t\beta_3 + C_t\beta_4 + \sum_k School_{kt}\delta_k + \varepsilon_t,$$

where $FAMU_{it}$ = 1 if pupil i's teacher in year t graduated from Florida A & M University; = 0, otherwise.

Teacher's demographic characteristics = {years of teaching experience, African American male, African American female, white male, white female (omitted), Latino, Latina, Native American male, Native American female, Asian male, Asian female, mixed race male, mixed race female, other race male, other race female}. We capture a teacher's analytical skills, intellectual development, and work ethic prior to college entry by a vector of college entry examination scores, viz., scholastic achievement test (SAT) mathematics and verbal scores, and teacher's undergraduate grade point average within the State University System of Florida.

The following variables control for pupil heterogeneity: race (black, white, Hispanic) and gender identity of the pupil; English language learner status of the pupil, that is, whether the pupil is currently enrolled in classes specifically designed for limited English proficiency (LEP) students or pupil is classified as LEP pupil but not enrolled in LEP classes, pupil who left the LEP program within past 2 years or who left the LEP program more than 2 years ago; pupil is eligible for free or reduced price lunch; primary exceptionality (22 controls for learning disabilities, alternative measures of handicap status, and giftedness).[2]

Other controls include grade of pupil and year of examination.

Teacher's college major consists of 21 academic disciplines within the College of Education and 36 content areas outside of the College of Education.

The teacher preparation institutions included in this study include Florida's initial teacher preparation programs, which consist of three mostly two-year degree institutions, Chipola College, Miami-Dade College, and St. Petersburg College, and the public colleges and universities of the State University System (SUS) of Florida. The SUS institutions include

Florida International University, University of West Florida, University of Central Florida, Florida Gulf Coast University, University of Florida, University of South Florida, University of North Florida, Florida State University, Florida Agricultural & Mechanical University, New College, Florida Atlantic University}. The SUS institutions differ in size, scope, and student demographics. For example, New College of Florida is a small liberal arts institution, classified as a Baccalaureate College by the Carnegie Foundation. It does not have a College of Education. Florida Gulf Coast University (FGCU) and the University of North Florida (Univ. of North Florida) have Carnegie designations as Master's Colleges and Universities - Larger Programs. FGCU does not have offer tenure to its faculty nor does its College of Education offer a doctoral degree.

Florida A & M University (FAMU) and the University of West Florida (UWF) are medium size institutions classified as Doctoral/Research Universities. UWF and FAMU offer a Doctor of Education and a Doctor of Philosophy, respectively, in educational leadership.

Florida Atlantic University (FAU) and University of Central Florida (UCF) are Research Universities - High Research Activity. Both offer Doctor of Education and Doctor of Philosophy degrees. FAU has an EPI, while University of Central Florida has a PTO program.

Florida State University (FSU), University of Florida (UF), University of South Florida (USF), and Florida International University (FIU) are Research Institutions – Very High Research Activity. Each offers multiple doctoral degrees. The US News and World Report shows that the University of Florida's College of Education has nationally ranked graduate academic programs: counselor education (No. 3), special education (5) and educational administration (26). "Overall, the college ranks 54th nationally and 25th among public education institutions in the elite Association of American Universities (http://www.coe.ufl.edu/)."

FAMU and FIU are minority serving institutions. FAMU is one of the largest and most prominent public Historically Black College or University and FIU is America's premier predominantly Hispanic university.

We test for the statistical significance and substantive educational importance of teacher's program of preparation. Our primary hypotheses are

H_0: $\beta_1 = 0$,

H_1: $\beta_1 \neq 0$.

Pupil learning during a given period depends on a pupil's entire history of learning, as affected by previous socioeconomic status, past teachers, natural ability, developed ability, past peers, and so forth. Thus, $A_{i,t-1}$ is a baseline achievement measure, a sufficient statistic for all past unobserved educational inputs and a pupil's endowment of mental capacity. Todd and Wolpin (2003) show that baseline achievement ($A_{i,t-1}$) is endogenous, that is, $E(\varepsilon_t|A_{i,t-1}) \neq 0$.

There are functional form and specification challenges posed by this endogeneity issue. One approach ignores the endogeneity problem and estimates (1) as specified (Noelle, et al., 2008; Boyd, et al., 2008; Chingos and Peterson, 2010). This approach yields parameter estimates that are biased and inconsistent and the standard errors are incorrect.

A second approach seeks to eliminate the endogeneity problem via an annual gain specification of the achievement function. This approach assumes $\alpha = 1$ and uses ordinary least squares to estimate

(2) $A_{ijkt} - A_{i,t-1} = \beta_0 + \beta_1 FAMU_{it} + \beta_2 Grade_{it} + T_t\beta_3 + C_t\beta_4 + \sum_k School_{kt}\delta_k + \varepsilon_t$.

However, the annual gain specification is inappropriate on three grounds: i) it imposes a very strong assumption on learning persistence; ii) it misspecifies the achievement function; and, iii) it exacerbates the endogeneity problem.

The annual gain specification requires perfect learning persistence ($\alpha = 1$), that is, all learning from the previous year carries over without loss to the current year and to all future years of learning. For this assumption to hold, everything a pupil learned in 2nd grade would persist (without any decay) for the pupil in 3rd grade and equal the achievement effects for every grade beyond 3rd grade. Harris and Sass (2008) address this problem by allowing the persistence coefficient (α) to take on a range of values within the interval [0.20 – 1.0]. Mostly, for elementary school and middle school, their results show that parameter estimates and standard errors decline as α decreases from 1.0 to 0.20. For high school, the opposite effect holds; namely, parameter estimates and standard errors increase as α decreases from 1.0 to 0.20.

Harris and Sass find no changes in the qualitative effects of parameters as the persistence coefficient varies and no changes in statistical significance for high school pupils, and no changes in statistical significance for 9 of 10 middle school equations. For the sole middle mathematics equation where there is an important change in statistical significance, the size of the test for the coefficient on the variable on interest moves from 0.05 to 0.10 as α decreases from 0.60 to 0.40 and the size of the test becomes greater than 0.10 at $\alpha = 0.20$. Similarly, for a middle school reading equation, the size of the test for the parameter of interest moves from 0.05 to 0.10 as α decreases from 0.40 to 0.20.

For elementary school, for 3 of 5 reading equations, Harris and Sass (2008) find that the size of test is constant at 0.10 as the persistence coefficient takes on a range of values within the interval [0.60 – 1.0]. But, the size of the test > 0.10 for $\alpha = 0.40$ and $\alpha = 0.20$. For the elementary school mathematics equations, the parameter of interest becomes statistically insignificant for $\alpha = 0.60$, $\alpha = 0.40$, and $\alpha = 0.20$ and is significant at the 5 percent and 10 percents levels $\alpha = 1.0$ and $\alpha = 0.80$, respectively.

The Harris and Sass results suggest that for both reading and mathematics and for elementary, middle, and high school, the persistence coefficient falls into the range $0.60 \leq \alpha < 1.0$. Mason (2010b) finds complementary results, though Mason also shows that learning persistence may vary according the race and gender of pupils as well as grade level. Using the instrumental variables specification (discussed below), Mason finds that point estimates for mathematical persistence are in the interval [0.65 – 0.78] and point estimates for reading persistence are in the interval [0.72 – 0.89]. For both reading and mathematics achievement, elementary school pupils have the highest persistence effect.

Equation (1) is an autoregressive distributive lag model. For this class of models, it is well known that $\alpha = 1$ indicates that the achievement function has a unit root; hence, neither $E(A_t |A_0)$ nor $Var(A_t |A_0)$ is a constant, so the achievement values will increase overtime without limit. When a unit root exists, coefficients are biased (though consistent), the standard errors are incorrect, and spurious correlation may occur.

Differencing the dependent variable is a common method for insuring that the series is stationary. Differencing equation (1) yields

(3) $A_t - A_{t-1} = A_{t-1} - A_{t-2} + \beta_1(X_t - X_{t-1}) + (\varepsilon_t - \varepsilon_{t-1})$ or

$\Delta A_t = \Delta A_{t-1} + \beta_1 \Delta X_t + \nu_t$.

where X represent all explanatory variables other than prior year achievement. Note that the correct annual gain specification, equation (3), is different in important ways from the annual gain specifications that are usually estimated in econometric practice, equation (2). Specifically, equation (2) suffers from omitted variable bias, since ΔA_{t-1} is omitted, and misspecification of the covariates, since X_t is used in equation (2) instead of ΔX_t as in equation (3). Equation (3) worsens the endogeneity problem associated with equation (1). We know $E(\varepsilon_t |A_{t-1}) \neq 0$, $E(\varepsilon_{t-1} |A_{t-2}) \neq 0$, and $E(\varepsilon_{t-1} |A_{t-1}) > 0$; hence, $E(\nu_t |\Delta A_{t-1}) \neq 0$. Differencing (1) solved the stationarity

problem but it amplified the endogeneity problem. Utilizing (3), we would need instruments for both A_{t-1} and A_{t-2}.

Instrumental variable estimation provides a third approach for estimating (1). Per Todd and Wolpin (2003), $E(\varepsilon_t|A_{i,t-2}) = 0$ and $E(A_{i,t-1}|A_{i,t-2}) \neq 0$. We may use the latter conditional expectation to obtain a predicted baseline achievement measure $\hat{A}_{i,t-1}$ and thereby obtain consistent parameter estimates from equation (4).

(4) $A_{ijkt} = \beta_0 + \alpha \hat{A}_{i,t-1} + \beta_1 FAMU_{it} + \beta_2 Grade_{it} + T_t\beta_3 + C_t\beta_4 + \sum_k School_{kt}\delta_k + \varepsilon_t$.

This approach requires at least 3 years of test scores. Only the final year of observations is available for analysis. For an imbalanced 3-year panel, such as that utilized in this study, only a fraction of the final year of observations is available for analysis. If a non-random fraction of pupils have 3 years of test scores then the instrumental variable procedure may introduce selection bias into the estimation process.

Equation (5) presents a fourth approach. It is an imputed persistence approach, combining the strengths of the annual gain and instrumental variable specifications. Specifically, we use the instrumental variable specification to obtain a race-sex group specific estimation of the persistence coefficient (α). Given the race-sex estimate $\hat{\alpha}_{rs}$ we then estimate an annual gain specification that is free of the assumption that $\alpha = 1$. A strength of this approach is that we will have just as many observations as in the annual gain specification; hence, we avoid both the possibility of selection bias, as in equation (4). Further, by not imposing $\alpha = 1$, we also avoid strong assumptions on learning persistence, the unit root problem, and the amplified endogneity problem, all associated with equation (2).

A weakness of equation (5) is that the imputed point estimate for the persistence parameter ($\hat{\alpha}_{rs}$) may not unbiased or consistent; hence, the dependent variable of equation (5) may suffer from measure error. If so, the coefficient estimates will be unbiased, consistent, and efficient but the standard errors of the estimates are larger than they would be in the absence of the error-in-variables problem for the dependent variable. Further, measurement error will reduce R^2 (goodness-of-fit) relative to the case without measurement error. Hence, coefficient estimates from (5) are less likely to reject the null hypothesis relative to a model estimated without measure error for the dependent variable.

(5) $A_{ijkt} - \hat{\alpha}_{rs} A_{i,t-1} = \beta_0 + \beta_1 FAMU_{it} + \beta_2 Grade_{it} + T_t\beta_3 + C_t\beta_4 + \sum_k School_{kt}\delta_k + \varepsilon_t.$

Finally, rather than concentrating on estimating the level of pupil academic achievement, equation (6) seeks to estimate the net growth in academic achievement. This is a flow-to-flow specification: a flow of teacher, pupil, family, and school resources during current year yields a flow of net academic growth during the current year.

(6) $\left(\frac{A_{ijk,t} - A_{ijk,t-1}}{A_{ijk,t-1}} \right) = \beta_0 + \beta_1 FAMU_{it} + \beta_2 Grade_{it} + T_t\beta_3 + C_t\beta_4 + \sum_k School_{kt}\delta_k + \varepsilon_t.$

Nevertheless, this specification suffers from all of the weaknesses of equation (2). Its primary strength is the ease of interpretation of its coefficients. Namely, the coefficients represent annual growth rates or rates of return associated with particular explanatory variables. Mean levels of learning gains (expected increases in standardized test scores) vary according to grade level, so that a given annual gain for 4^{th} grade and 10^{th} grade does not represent the same mean percentage increase. The net growth specification, equation (6), allows us to compare the program effects on learning growth across grade levels.

For each specification we estimate 12 equations: separate equations for male and female pupils, for African Americans, Hispanics, and whites, and for mathematics and reading achievement. Following Mason (2010b), who provides a detailed exploration of the merits of these models, equation (5), the imputed persistence parameter specification, is our preferred model. The measurement error associated with this model creates higher standard errors than would be the case in the absence of measurement error (though the parameter estimates are efficient) and reduces the overall fit of the model; hence, the signs of the coefficients are valid, even though the t-statistics are less likely to reject the null hypothesis than would be the case if we did not have measurement error, and R^2 will be lower. The instrumental variable specification (equation 4) may create selection bias in our sample because we do not have a balanced sample. Our sample is limited to pupils with teachers with less than 5 years of experience; hence, for a given three-year period, we would not have the pupil's test score for the year or years the pupil had a highly experience teacher, that is, a teacher with 6 or more years of experience. Also, during a given three year period, pupils may move into or out of the sample, which also contributes to imbalance. When the imputed persistence and instrumental variable specifications have parameters with the same sign and the parameter is statistically significant in both specifications, we can be confident of the qualitative effect of the parameter estimate.

By contrast, the parameter estimates are inconsistent and the standard errors are incorrect for the lagged dependent variable (1), annual gain (2), and net growth (6) specifications. For these specifications, we do not know the direction of the bias of the estimated coefficients. The lagged dependent variable specification suffers from endogenous variable bias, while the annual gain and net growth specifications require perfect learning persistence and suffer from omitted

variable bias, variable misspecification, measurement error, and heighten endogenous variable bias.

III. Data

Description of variables

The data are provided by Florida's K20 Education Data Warehouse, covering pupils and their new teachers who graduated from a Florida university during the academic years 2001-2002 to 2005-2006. The teacher sample is limited to persons teaching mathematics or English courses. Pupil data refer only to pupils in mathematics and English/reading courses taught by teachers in Florida's public schools, with FCAT scores for 1998-1999 to 2005-2006. Teachers and pupils are merged via a common course identification number. Each educator teaches within the state of Florida and, therefore, has passed an identical series of state administered certification examinations. Since all educators are new teachers (no teacher has more than 5 years of post-graduation experience), they were trained by a roughly similar set of teacher-educators and other collegiate faculty at each undergraduate institution.

Experience and attrition will have a positive (negative) correlation if professional attrition is relatively higher (lower) among poor quality teachers. Given the short duration of their teaching career, on-the-job training effects (captured by years of experience) will not be confounded by attrition (Kane, Rockoff, and Staiger, 2006). If experience varies by institutional status, then estimates of the marginal effect of teacher preparation on pupil learning will be biased, inconsistent, and inefficient because of the correlation of experience and attrition. Hence, given a sample of new teachers, on-the-job training and undergraduate teacher preparation program status are uncorrelated.

Table 4 presents descriptive statistics by race of pupil. Eight percent, 2.5 percent, and 2 percent of African American, Hispanic, and white pupils, respectively, are taught by graduates of FAMU. Seventeen percent of African American pupils are taught by graduates of FAU, while 34 percent and 21 percent of Hispanic and white graduates are taught by graduates of FIU and USF, respectively. White women are the largest group of teachers of African American (40 percent), Hispanic (36 percent), and white pupils (62 percent). African American and Hispanic pupils have teachers with nearly equal SAT scores, though the SAT scores of teachers of white pupils are slightly higher.

[Insert Table 4]

Thirty-eight percent of teachers of African American pupils have an education degree, versus 43 percent and 51 percent of teachers of Hispanic and white pupils. Twenty-five percent of teachers of African American and Hispanic pupils have English degrees, while 20 percent of teachers of white pupils have English degrees. Just 4 percent of teachers of African American pupils have a degree in mathematics or statistics, while only 3 percent of teachers of Hispanic and white pupils have a mathematics or statistics degree.

About 10 percent of African American pupils and 2.5 percent of white pupils are enrolled in or eligible for enrollment in limited English proficiency courses. However, 60 percent of Hispanic pupils are currently enrolled in or eligible for enrollment in limited English proficiency courses. Two-thirds of African American pupils and 3/5 of Hispanic pupils are eligible for free or reduce price lunch, but only 27 percent of white pupils are eligible for free or reduced price lunch.

Ten percent, 11 percent, and 12 percent of African American, Hispanic, and white pupils have a specific learning disability, but 1.6 percent, 3.8 percent, and 5.1 percent, respectively, are

classified as gifted pupils. Roughly equal percentages of each group of pupils are enrolled in grades 3 – 11.

Table 5 presents FCAT scores consistent with one year's growth in pupil academic achievement, while Tables 6 – 8 present unadjusted teacher preparation program differentials, by the race and gender of pupils. These are the raw teacher program differentials this study seeks to explain. In addition to teacher preparation program, the covariates are only grade level and academic year. All teachers have a college of education bachelor's degree. Florida Atlanta University (FAU) is the comparative university.

[Insert Table 5]

For all male elementary school pupils, there are no statistically significant reading differences for FAMU graduates relative to FAU graduates (Table 6). Contrarily, male African American, Hispanic, and white elementary pupils taught by FAMU graduates have raw mathematics scores that are 57 points, 119 points, and 69 points lower, respectively, than pupils taught by FAU graduates.

For all female elementary school pupils, there are statistically significant reading and mathematics differences for FAMU graduates relative to FAU graduates (Table 6). Female African American, Hispanic, and white pupils taught by FAMU graduates have mathematics scores that are 55 points, 135 points, and 61 points lower, respectively, than pupils taught by FAU graduates, while the reading effects are 36 points, 64 powers, and 44 points lower, respectively.

[Insert Tables 6 - 8]

Male Hispanic middle school pupils taught by graduates of FAMU have mathematics scores 78 points below pupils taught by FAU graduates (Table 7). Conversely, male Hispanic

pupils taught by FAMU graduates have readings scores more than 100 points greater than pupils taught by FAU. Otherwise, FAMU status is statistically insignificant. Female African American middle school pupils taught by graduates of FAMU have mathematics and readings scores that are 59 points below FAU taught pupils (Table 7). Otherwise, FAMU status is statistically insignificant.

Relative to FAU, there is no statistically significant mathematics effect for male high school pupils taught by FAMU graduates (Table 8). The FAMU effect for male Hispanic pupils is 106 points above the scores for pupils taught by FAU trained teachers. Relative to FAU, there is no statistically significant mathematics or reading effects for female high school pupils taught by FAMU graduates (Table 8).

IV. Results

We estimate and present the results for all five specifications of the pupil academic achievement equation. The FAMU teacher program effect has virtually no sign differences between alternative specifications, though the specifications do exhibit differences in the statistical significance and absolute value of parameters Each of these specifications has weakness: the lagged dependent variable approach has an endogeneity problem; the annual gain specification makes an unacceptable assumption regarding achievement persistence; the instrumental variable approach greatly reduces degrees of freedom and may thereby create a selection bias problem; and, the imputed coefficient and net growth specifications explain only a small proportion of the variation in their respective dependent variables. With a balanced panel, the instrumental variable specification would be the preferred specification. Given the econometric problems associated with alternative specifications, the imputed persistence equation is our preferred specification. It is the only specification with consistent and efficient parameter estimates.

Our initial results are obtained from a sample limited to pupils taught by teachers who obtained an education degree. Tables 9a, 10a, and 11a contain the FAMU program effects for elementary school, middle school, and high school male pupils. Tables 9b, 10b, and 11b contain the same information for female pupils. More often than not, the teacher program effects are statistically insignificant. Considering the full set of results, FAMU teachers perform as well as teachers trained at all other teacher preparation programs and as well as teachers trained at Florida Atlanta University. These conclusions vary slightly across grade levels.

Elementary school

For elementary school males, for both mathematics and reading, there is insufficient evidence to reject the null hypothesis of no FAMU program effects on pupil academic achievement.

For elementary school females, there are negative FAMU program effects on Hispanic and white reading achievement and African American mathematics achievement. In particular, African American female pupils with FAMU teachers have mathematics scores that are 43 points points lower than the mathematics scores of otherwise identical African American female pupils taught by teachers trained at all other Colleges of Education.

Female Hispanic elementary school pupils taught by FAMU trained teachers have reading score annual gains that are 47 points lower the reading achievement of pupils taught by all other university education program teachers. The reading annual gains program effect for white females taught by FAMU teachers is 40 points lower relative to the achievement gains of all other white female pupils.

Middle school

The FAMU program effect on the mathematics achievement of white male pupils, relative to pupils taught by graduates of all other programs is 24 points. There are negative FAMU program effects for African American mathematics (-32 points) and white female reading (-17 points), but positive FAMU program effects for Hispanic female mathematics (25 points).

High school

Hispanic male high school pupils taught by FAMU trained teachers have reading scores that are 67 points above average. The FAMU program effect for white male mathematics is -25 points. There is no statistically significant FAMU effect for female high school pupils.

[Insert Tables 9 - 11]

Summary

Considered as a whole, there is neither a consistently negative or positive FAMU program effect. For 75 percent of the regressions (27 of 36 parameter estimates), there are no statistically significant FAMU program effects. For 3 of 36 regressions (1 female and 2 male) there is a positive FAMU program effect and for 6 of 36 regressions (5 female and 1 male) there is a negative FAMU program effect.

Considering the reading results alone, among male pupils, FAMU is modestly above average relative to teacher education programs at all other universities. Among female pupils, FAMU teachers perform moderately less well than education majors trained at all other universities. Considering the mathematics results alone, among male and female pupils, teachers trained within with FAMU's College of Education are statistically indistinguishable from teachers trained within Colleges of Educations at all other universities.

[Insert Table 11]

Robustness of results: all teachers[3]

In a separate set of regressions we sought to determine the college preparation effect of all graduates of Florida A & M University rather than just teacher education program graduates. We obtain even few statistically significant results. Just 9 of the 36 regressions indicate either a positive or negative effect with 75 percent of the regressions showing no college preparation effects for FAMU. These results re-affirmed our conclusion that the quality of teachers supplied by FAMU are equal to the average of quality of teachers supplied by all other Florida universities, regardless of whether those teachers received a degree within the College of Education or within another major academic unit.

Hispanic male and white male elementary pupils taught by graduates of FAMU have academic scores that 30 points lower (mathematics) and 19 points lower (mathematics), respectively, than the academic achievement of otherwise identical pupils taught by other institutions. However, African American male elementary pupils have reading scores that are 26 points higher than the average reading scores of African American male elementary pupils that are taught by graduates of all other Florida universities. The reading scores of African American female and white female elementary school pupils taught by FAMU graduates are 21 points higher and 32 points lower, respectively, than the reading scores of white female elementary school pupils taught by all other Florida university graduates.

The mathematics scores of white male middle school pupils taught by FAMU graduates are 16 points higher than the mathematics scores of white male middle school pupils taught by all other Florida university graduates. The mathematics scores of African American female middle school pupils taught by FAMU graduates are 17 points lower than the mathematics scores of African American female middle school pupils taught by graduates of other institutions.

The mathematics scores of white male high school pupils taught by FAMU graduates are 19 points lower than the mathematics scores of white male high school pupils taught by all other Florida university graduates. African American female pupils taught by FAMU graduates have mathematics scores that are 10 points lower than average.

Robustness of results: all African American teachers

In another a set of regressions we sought to determine the college preparation effect of all African American graduates of Florida A & M University relative to all African American graduates of Florida's other universities. Only 4 of the 36 regressions indicate either a positive or negative effect, an indication that 89 percent of the regressions show no statistically significant college program effect for FAMU. We conclude that all African American FAMU graduates supplied to the teaching profession, regardless of college major, are equal to the average of quality of teachers supplied by all other Florida universities.

White male elementary school pupils taught by African American teachers trained at FAMU have reading scores that are 29 points lower than the reading scores of otherwise identical middle school white male pupils taught by African Americans teachers who graduated from other Florida universities. There are no significant program effects for elementary school female pupils.

There are no significant program effects for middle school male pupils. White female middle school pupils taught by FAMU African American trained teachers have mathematics scores that 22 points lower than the mathematics scores of pupils taught by African American teachers prepared at all other universities and at FAU, respectively.

White male high school pupils taught by African American graduates of FAMU have mathematics scores that are 22 points lower than the mathematics scores of otherwise identical

white male high school pupils taught African American graduates of other Florida universities. Hispanic female high school pupils taught by African American graduates of FAMU have mathematics scores that are 16 points higher than the mathematics scores of otherwise identical Hispanic female high school pupils taught African American graduates of all other Florida universities.

Robustness of results: African American education graduates

Finally, we assessed the robustness of our results by comparing the value-added impact of African American teacher education programs graduates of FAMU relative to the value-added impact of African American teacher education program graduates of other Florida universities. Seven of the 36 regressions indicate either a positive or negative effect, an indication that 81 percent of the regressions show no statistically significant college program effect for FAMU. We conclude that FAMU African American College of Education graduates supplied to the teaching profession are equal to the average of quality of African American teachers supplied by Colleges of Education of all other Florida universities.

The reading scores of white male, Hispanic female, and white female elementary school pupils taught by FAMU graduates are 59 percent lower, 60 points lower, and 70 points lower, respectively, than the average reading scores of otherwise identical male and female elementary school pupils. The mathematics scores of white male and female middle school pupils are 21 points and 45 points below average. Middle school African American female taught by FAMU graduates have mathematics scores that are 30 points below average. Relative to other Hispanic male high school male pupils, Hispanic male pupils taught by African American graduates of FAMU's teacher education program have reading scores that are 66 points above average.

V. Discussion: limitations and conclusions

We estimate five specifications of the pupil academic achievement equation: lagged dependent variable (1), annual gain (2), instrumental variable (4), imputed persistence (5), and net growth (6) specifications. Ordinary least squares is used to estimate all specifications. The standard errors are adjusted for clustering: pupils with the same teacher have correlated standard errors. We estimate separate regressions for elementary (grades 3 – 6), middle (grades 7 – 8), and high school (grades 9 – 12). Within each of these educational segments, we estimate separate regressions for African American males, African American females, Latinos, Latinas, white males, and white females. For each race-gender group, we estimate a separate equation for mathematics and readings. Finally, we use a single binary variable comparing Florida A & M University to all other programs. The estimation strategy yields a set of 36 regressions for each of the following sub-sample: all College of Education graduates, all graduates, all African American graduates, all African American College of Education graduates..

Our results show that FAMU's teacher education is of average quality relative to all other teacher education programs in the state of Florida. This appears to be a robust conclusion. Our results are roughly the same regardless of whether we confine the sample to pupils matched with traditionally trained teachers (college of education graduates), all teachers, all traditionally trained African American teachers, or all African American teachers.

The near absence of college preparation effects on pupil achievement is for teachers with 1-5 years of experience; hence, it is unlikely to have occurred because of differences in teacher attrition based on a teacher's college of preparation. Also, this study does not contain any information on the cost of training teachers by college of preparation. If, as this study suggests, teachers are of nearly equal quality regardless of their institution of preparation, but teacher preparation are relatively less expensive at some Florida institutions than at other Florida

institutions, then there may be efficiency differences among Florida's institutions of higher education.

An important limitation of this study is that we do not have information on the effectiveness of Florida-trained teachers employed outside the state of Florida or outside of teaching within the State of Florida. Milton, et al. (2008) find that 72 percent of Initial Teacher Preparation program completers are employed in a Florida school. Only 59 percent of our Florida A & M University college of education completers is employed in a Florida school compared to 71 percent for Florida Atlanta University, 76 percent for Florida International University, 60 percent for Florida State University, and 61 percent for the University of Florida. Hence, strictly speaking, our results provide program effects for teachers who graduated from a Florida university and who choose to remain within the state of Florida. An additional important limitation of this study is that we do not control for the quality of educational leadership of individual schools. We have no information on the direction or the statistical significance of the correlation between the preparation program of teachers and the quality of educational leadership of the schools of employment of teachers.

Also, the present study as well as the professional literature equates college preparation effects with mean test scores. But, the absence of a mean test score effect does not rule an inequality effect as capture that the standard deviation of test scores. For example, teachers trained at institutions which emphasize "excellence" and teachers at institutions which emphasize "equity" may have pupils with identical mean test scores but with statistically significant differences in the standard deviation of test scores. Knowing whether a high mean score has occurred because a teacher has raise the scores of all pupils or just raised the scores of a few superstar pupils is a substantive policy issue.

Finally, this study has modeled education as a single product industry, that is, we have assumed that pupil standardized test scores are the sole output. However, it may be the case that education is a joint product industry, producing standardized test scores, disciplinary behavior, information regarding career opportunities, retention and promotion, and so forth. The near absence of a college preparation effect for standardized test scores does not provide information on these simultaneous educational outcomes. Further, our study does not examine academic outcomes other than reading and mathematics. Historical knowledge, science, art, and vocational preparation are important academic outcomes that may have college preparation effects. Finally, there are important non-academic outcomes that may have college preparation effects teen pregnancy prevention, absence of negative contact with the criminal justice system, and constructive civic engagement.

Notes

[1] After examining a nationally representative dataset, Bettinger and Long (2005:1) conclude that "students in remediation are more likely to persist in college in comparison to students with similar test scores and backgrounds who were not required to take the courses. They are also more likely to transfer to a higher-level college and to complete a bachelor's degree." This is one of several instances where FAMU is ahead of the curve in meeting the needs of students who have had restricted educational opportunities.

[2] Primary exceptionalities include the following: educable mentally handicapped, trainable mentally handicapped, orthopedically impaired, occupational therapy, physical therapy, speech impaired, language impaired, deaf or hard of hearing, visually impaired, emotionally handicapped, specific learning disabled, gifted, hospital/homebound, profoundly mentally handicapped, dual-sensory impaired, autistic, severely emotionally disturbed, traumatic brain injured, developmentally delayed, established conditions, other health impaired, unknown.

[3] To economize on space we do not present here the regressions associated with our alternative discussions of the robustness of results. However, these results are available from the author upon request.

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Table 1. Percent of pupils with 50 percent or higher learning gains

	Reading			Mathematics		
	ITP	DAC	EPI	ITP	DAC	EPI
Elementary school	88	83	**93**	81	**85**	77
Middle school	**91**	90	**91**	79	82	**84**
High school	**37**	35	31	89	**96**	82

Data are taken from Florida Department of Education, 2010.

Table 2. State University System of Florida (SUS)

Institution	Students	Carnegie Classification	College of Education
FL A & M Univ.	13,067	DRU: Doctoral/Research Universities	Ph.D., Educ. Leadership PTO
FL Atlantic Univ.	25,319	RU/H: Research Universities (high research activity)	Ed.D., Curriculum Instruction, Exceptional Student Ed. Ph.D., Counselor Educ., Educ. Leadership EPI
FL Gulf Coast Univ.	5955	Master's L: Master's Colleges and Universities (larger programs)	M.A. & M.Ed., Many programs EPI, PTO
FL International Univ.	34,865	RU/VH: Research Universities (very high research activity)	Ed.D., Adult Ed. & Human Resource Dev., Curriculum & Instruction, Ed. Admin. & Supervision, Execeptional Stud. Educ., Higher Educ. Admin., Ph.D., Curriculum & Instruction PTO
FL State Univ.	38,431	RU/VH: Research Universities (very high research activity)	Ph.D. & Ed.D., Many programs PTO
New College of FL	692	Bac/A&S: Baccalaureate Colleges--Arts & Sciences	No Education degree
Univ. of Central FL	42,465	RU/H: Research Universities (high research activity)	Ph.D. & Ed.D., Many programs PTO
Univ. of FL	47,993	RU/VH: Research Universities (very high research activity)	Ph.D. & Ed.D., Many programs EPI, PTO
Univ. of South FL	42,238	RU/VH: Research Universities (very high research activity)	Ph.D., Ed.D. Many programs
Univ. West FL	9,518	DRU: Doctoral/Research Universities	Ed.D., Alternative/Special Education, Teaching and Learning EPI, PTO
Univ. of North FL	14,533	Master's L: Master's Colleges and Universities (larger programs)	Ed.D., Educational Leadership EPI

Source: Data are derived from Carnegie Foundation for the advancement of teaching (http://www.carnegiefoundation.org/) and the web sites of each university.

Table 3. Alternative estimates of achievement persistence

	Mathematics		Reading	
	Point	Confidence interval	Point	Confidence interval
Elementary school	0.78	0.70-0.86	0.89	0.78-1.00
Middle school	0.76	0.67-0.86	0.72	0.64-0.81
High school	0.65	0.59-0.71	0.80	0.70-0.90

Data are taken from Mason (2010a).

Table 4. Descriptive statistics, reading and mathematics classes, grades 3 -12, by race, 2000 – 2006

	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
FCAT Mathematics	280,488	1699	224,181	1774	429,362	1836
FCAT Reading	276,326	1632	221,535	1711	425,671	1818
Reading,annual gain	274,138	102.33	220,040	118.92	422,844	86.17
Mathematics,annual gain	278,508	93.22	222,855	93.58	427,307	78.31
Teacher Characteristics						
Fl Atlantic Univ.	284,254	0.1665	228,085	0.1235	433,240	0.0970
Fl International Univ.	284,254	0.1218	228,085	0.3434	433,240	0.0415
Univ. of West Fl	284,254	0.0333	228,085	0.0067	433,240	0.0612
Univ. of Central Fl	284,254	0.1188	228,085	0.1384	433,240	0.1830
Fl Gulf Coast Univ.	284,254	0.0169	228,085	0.0353	433,240	0.0371
Univ. of Fl	284,254	0.1135	228,085	0.0838	433,240	0.1258
Chipola Community Coll	284,254	0.0001	228,085	0.0000	433,240	0.0007
Univ. of South Fl	284,254	0.1283	228,085	0.1144	433,240	0.2055
Univ. of Miami	284,254	0.0001	228,085	0.0001	433,240	0.0000
Univ. of North Fl	284,254	0.0774	228,085	0.0173	433,240	0.0763
Fl State Univ.	284,254	0.1311	228,085	0.0927	433,240	0.1356
Fl Agri. & Mech. Univ.	284,254	0.0766	228,085	0.0247	433,240	0.0215
St. Petersburg College	284,254	0.0018	228,085	0.0013	433,240	0.0045
New College	284,254	0.0007	228,085	0.0012	433,240	0.0014
SUS grade point avg	280,114	3.09	223,995	3.10	427,887	3.27
Experience	280,488	2.18	224,181	2.22	429,362	2.20
Afr. Amer. Male	284,254	0.0789	228,085	0.0403	433,240	0.0236
Afr. Amer. Female	284,254	0.2469	228,085	0.1242	433,240	0.0808
white male	284,254	0.1297	228,085	0.1095	433,240	0.1671
white female	284,254	0.3996	228,085	0.3556	433,240	0.6246
Latino	284,254	0.0316	228,085	0.0712	433,240	0.0123
Latina	284,254	0.0679	228,085	0.2576	433,240	0.0538
Native Amer. Male	284,254	0.0022	228,085	0.0015	433,240	0.0017
Native Amer. Female	284,254	0.0014	228,085	0.0004	433,240	0.0017
Asian Amer. Male	284,254	0.0040	228,085	0.0025	433,240	0.0034
Asian Amer. Female	284,254	0.0105	228,085	0.0093	433,240	0.0082
mixed race male	284,254	0.0000	228,085	0.0000	433,240	0.0006
mixed race female	284,254	0.0002	228,085	0.0003	433,240	0.0002
other male	284,254	0.0035	228,085	0.0025	433,240	0.0033
other female	284,254	0.0103	228,085	0.0079	433,240	0.0098
SAT Mathematics	152,589	513	131,693	514	242,749	531
SAT Verbal	152,765	518	130,562	520	242,192	538

Table 4 (continued). Descriptive statistics, by race, 2000 – 2006

	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
Teacher Characteristics (continued)						
Special education	284,254	0.0310	228,085	0.0226	433,240	0.0401
Spec learn disabil educ	284,254	0.0183	228,085	0.0354	433,240	0.0114
Elementary education	284,254	0.1476	228,085	0.1551	433,240	0.1864
Middle education	284,254	0.0155	228,085	0.0029	433,240	0.0276
Secondary education	284,254	0.0143	228,085	0.0100	433,240	0.0234
Early childhood dev educ	284,254	0.0001	228,085	0.0001	433,240	0.0001
Agricultural education	284,254	0.0001	228,085	0.0001	433,240	0.0002
Art teacher education	284,254	0.0002	228,085	0.0002	433,240	0.0004
Business education	284,254	0.0005	228,085	0.0002	433,240	0.0005
English education	284,254	0.0762	228,085	0.0956	433,240	0.1137
Foreign language education	284,254	0.0004	228,085	0.0003	433,240	0.0004
Health education	284,254	0.0001	228,085	0.0003	433,240	0.0001
Home economics education	284,254	0.0004	228,085	0.0009	433,240	0.0003
Mathematics education	284,254	0.0505	228,085	0.0732	433,240	0.0841
Music education	284,254	0.0009	228,085	0.0005	433,240	0.0008
Physical education	284,254	0.0046	228,085	0.0052	433,240	0.0037
Science education	284,254	0.0009	228,085	0.0032	433,240	0.0015
Social science education	284,254	0.0064	228,085	0.0049	433,240	0.0096
Industrial arts education	284,254	0.0014	228,085	0.0012	433,240	0.0013
Agriculture	284,254	0.0023	228,085	0.0014	433,240	0.0026
Architecture	284,254	0.0009	228,085	0.0019	433,240	0.0006
Biology	284,254	0.0066	228,085	0.0065	433,240	0.0033
Business administration	284,254	0.0659	228,085	0.0531	433,240	0.0511
Computer & information sci	284,254	0.0134	228,085	0.0142	433,240	0.0067
Criminal justice	284,254	0.0111	228,085	0.0089	433,240	0.0073
Cultural studies	284,254	0.0004	228,085	0.0008	433,240	0.0004
Engineering	284,254	0.0220	228,085	0.0178	433,240	0.0090
English	284,254	0.2525	228,085	0.2497	433,240	0.2023
Foreign language	284,254	0.0060	228,085	0.0109	433,240	0.0040
Health	284,254	0.0114	228,085	0.0060	433,240	0.0077
History	284,254	0.0037	228,085	0.0021	433,240	0.0034
Home economics	284,254	0.0046	228,085	0.0048	433,240	0.0032
Inter-disciplinary studies	284,254	0.0011	228,085	0.0008	433,240	0.0005
Journalism & communications	284,254	0.0350	228,085	0.0313	433,240	0.0292
Legal profession	284,254	0.0001	228,085	0.0004	433,240	0.0007
Leisure	284,254	0.0045	228,085	0.0028	433,240	0.0057
Liberal arts	284,254	0.0232	228,085	0.0310	433,240	0.0293
Mathematics & statistics	284,254	0.0380	228,085	0.0279	433,240	0.0275
Natural resources	284,254	0.0003	228,085	0.0001	433,240	0.0003
Philosophy & religion	284,254	0.0019	228,085	0.0008	433,240	0.0022

Table 4 (continued). Descriptive statistics, by race, 2000 – 2006

	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
Teacher Characteristics (continued)						
Physics	284,254	0.0020	228,085	0.0011	433,240	0.0016
Psychology	284,254	0.0326	228,085	0.0307	433,240	0.0240
Public admin & service	284,254	0.0072	228,085	0.0055	433,240	0.0036
Social science	284,254	0.0530	228,085	0.0371	433,240	0.0428
Visual and performing arts	284,254	0.0087	228,085	0.0082	433,240	0.0075
Pupil Characteristics						
Male	284,254	0.4963	228,085	0.5089	433,240	0.5160
LEP, enrolled	284,254	0.0320	228,085	0.1500	433,240	0.0074
LEP, eligible	284,254	0.0632	228,085	0.4481	433,240	0.0187
Free or reduced lunch	284,254	0.6575	228,085	0.5986	433,240	0.2695
educable mentally handicapped	284,254	0.0119	228,085	0.0031	433,240	0.0028
trainable mentally handicapped	284,254	0.0001	228,085	0.0000	433,240	0.0000
orthopedically impaired	284,254	0.0009	228,085	0.0010	433,240	0.0015
speech impaired	284,254	0.0065	228,085	0.0051	433,240	0.0106
language impaired	284,254	0.0197	228,085	0.0091	433,240	0.0080
deaf or hard of hearing	284,254	0.0011	228,085	0.0011	433,240	0.0014
visually impaired	284,254	0.0003	228,085	0.0002	433,240	0.0004
emotionally handicapped	284,254	0.0219	228,085	0.0072	433,240	0.0173
specific learning disabled	284,254	0.1012	228,085	0.1141	433,240	0.1226
gifted	284,254	0.0161	228,085	0.0375	433,240	0.0508
hospital/homebound	284,254	0.0011	228,085	0.0010	433,240	0.0019
autistic	284,254	0.0004	228,085	0.0010	433,240	0.0011
severely emot disturbed	284,254	0.0041	228,085	0.0022	433,240	0.0025
traumatic brain injured	284,254	0.0002	228,085	0.0002	433,240	0.0002
established conditions	284,254	0.0001	228,085	0.0000	433,240	0.0000
other health impaired	284,254	0.0052	228,085	0.0059	433,240	0.0102
Grade 3	280,488	0.0101	224,181	0.0092	429,362	0.0053
Grade 4	280,488	0.0422	224,181	0.0469	429,362	0.0542
Grade 5	280,488	0.0385	224,181	0.0392	429,362	0.0470
Grade 6	280,488	0.1680	224,181	0.1534	429,362	0.1696
Grade 7	280,488	0.1723	224,181	0.1870	429,362	0.1854
Grade 8	280,488	0.1456	224,181	0.1549	429,362	0.1526
Grade 9	280,488	0.2244	224,181	0.2178	429,362	0.2141
Grade 10	280,488	0.1481	224,181	0.1597	429,362	0.1557
Grade 11	280,488	0.0379	224,181	0.0253	429,362	0.0131
Grade 12	280,488	0.0128	224,181	0.0067	429,362	0.0030

Table 4 (continued). Descriptive statistics, by race, 2000 – 2006

	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
School Characteristics						
Title 1 status						
Schoolwide 2000	284,254	0.4753	228,085	0.3696	433,240	0.1939
Targeted Assistance 2000	284,254	0.0241	228,085	0.0180	433,240	0.0437
Schoolwide 2001	284,254	0.4127	228,085	0.3381	433,240	0.1830
Targeted Assistance 2001	284,254	0.0161	228,085	0.0126	433,240	0.0284
Schoolwide 2002	284,254	0.3824	228,085	0.3144	433,240	0.1706
Targeted Assistance 2002	284,254	0.0100	228,085	0.0091	433,240	0.0224
Schoolwide 2003	284,254	0.3605	228,085	0.2952	433,240	0.1583
Targeted Assistance 2003	284,254	0.0057	228,085	0.0061	433,240	0.0102
Schoolwide 2004	284,254	0.3204	228,085	0.2579	433,240	0.1332
Targeted Assistance 2004	284,254	0.0020	228,085	0.0024	433,240	0.0060
Schoolwide 2005	284,254	0.2722	228,085	0.2092	433,240	0.1041
Targeted Assistance 2005	284,254	0.0012	228,085	0.0013	433,240	0.0033
Year 2000	284,254	0.0059	228,085	0.0054	433,240	0.0076
Year 2001	284,254	0.0502	228,085	0.0471	433,240	0.0569
Year 2002	284,254	0.1153	228,085	0.1095	433,240	0.1167
Year 2003	284,254	0.1963	228,085	0.1891	433,240	0.1939
Year 2004	284,254	0.2771	228,085	0.2775	433,240	0.2756
Year 2005	284,254	0.3420	228,085	0.3543	433,240	0.3405

Table 5.
FCAT developmental scale score gains consistent with one year's growth in learning

	Grade Interval						
	3-4	**4-5**	**5-6**	**6-7**	**7-8**	**8-9**	**9-10**
Reading	230	166	133	110	92	77	77
Math	162	119	95	78	64	54	48

Table 6. Unadjusted teacher preparation program effects: elementary school

	Males						Females					
	African American		Hispanic		White		African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading
FIU	-184.1***	-107.6***	-36.83	-95.08***	-49.59	-9.223	-47.56	-89.39***	-31.95	-77.23***	-59.65*	31.68
	(39.70)	(26.90)	(38.56)	(26.47)	(62.66)	(46.95)	(48.25)	(26.27)	(34.62)	(24.47)	(31.87)	(31.01)
UWF	-40.64	-23.91	-171.5**	15.16	-92.57**	-27.38	-90.02***	-3.077	-97.20	-18.29	-77.93**	-6.710
	(26.55)	(34.67)	(71.87)	(49.65)	(37.52)	(37.28)	(34.40)	(32.58)	(91.65)	(45.28)	(31.78)	(30.15)
UCF	0.395	-14.80	-92.66***	-31.45*	-41.70	20.62	-25.23	-14.43	-57.05**	-28.78**	-38.64*	17.81
	(20.14)	(13.98)	(27.56)	(16.11)	(25.92)	(14.61)	(22.63)	(13.66)	(27.35)	(14.11)	(20.88)	(12.31)
FGCU	11.20	-21.05	-55.37**	-106.9***	-42.43	-9.971	-27.03	-45.55*	-79.76***	-75.61***	-28.05	-32.35*
	(27.91)	(25.40)	(26.95)	(29.74)	(36.50)	(21.97)	(23.53)	(23.95)	(30.09)	(23.45)	(30.14)	(18.03)
UF	-39.08	-64.16***	-59.87**	-21.80	-76.08**	-23.04	-51.62*	-64.57***	-54.21*	-54.24**	-70.50**	-32.84*
	(25.64)	(21.61)	(27.68)	(21.65)	(38.69)	(20.08)	(27.96)	(21.26)	(32.19)	(25.06)	(34.55)	(17.52)
Chipola			50.70**	0	-59.87	105.9***			54.39***	-286.1***	-54.61	138.1***
			(24.70)	(0)	(89.18)	(17.68)			(19.91)	(15.65)	(39.14)	(14.25)
USF	-67.56***	-71.41***	-124.7***	-96.50***	-80.64***	-36.58**	-62.56***	-76.47***	-98.20***	-86.74***	-66.25***	-36.77**
	(23.31)	(15.47)	(29.97)	(19.63)	(28.25)	(18.43)	(23.25)	(15.75)	(26.70)	(19.72)	(23.16)	(15.11)
Miami			0	-695.0***					0	-541.1***		
			(0)	(15.91)					(0)	(15.65)		
UNF	-6.287	-19.29	-65.24*	9.597	-52.27	4.442	-33.45	-13.66	-45.28	25.77	-58.93**	-6.489
	(17.98)	(26.38)	(36.56)	(38.12)	(33.19)	(22.12)	(22.68)	(24.44)	(36.05)	(28.09)	(29.49)	(23.94)
FSU	-67.10**	-49.58**	-61.89	-50.42	-124.8***	-5.718	-69.84**	-46.51**	-67.00	-64.42*	-121.5***	-0.0497
	(34.07)	(23.14)	(45.79)	(33.07)	(37.50)	(22.58)	(27.10)	(22.74)	(42.99)	(33.07)	(39.98)	(18.38)
FAMU	-56.61**	-16.55	-119.0***	-54.18	-68.82**	-18.36	-55.30**	-35.73*	-134.5***	-64.28*	-61.46**	-43.65*
	(26.50)	(20.98)	(30.59)	(37.73)	(26.92)	(30.92)	(24.73)	(19.39)	(40.88)	(33.46)	(28.59)	(25.56)
St. Pete Coll	-248.3**	-301.2***	-154.3***	-82.13	-125.5***	-121.7**	-235.1***	-134.9**	-231.5***	-94.29	-181.9***	-70.47
	(120.0)	(81.99)	(55.51)	(61.95)	(38.84)	(56.71)	(56.49)	(61.73)	(69.27)	(73.15)	(58.10)	(48.79)
New College	0	0	0	0	0	0	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
N	4857	15262	3549	13075	9762	27780	4818	14345	3471	11630	8882	25155
R^2	0.078	0.105	0.091	0.113	0.084	0.107	0.096	0.118	0.093	0.138	0.097	0.102

Table 7. Male pupil academic achievement and teacher preparation program effects (unadjusted): middle school

	Male						Female					
	African American		Hispanic		White		African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading
FIU	-57.79	-172.9***	4.040	-40.48	50.21	-52.58	-93.21**	-181.0***	-0.446	0.0870	46.77	-62.65
	(45.50)	(43.64)	(28.22)	(58.30)	(36.27)	(52.69)	(38.58)	(45.44)	(35.33)	(51.11)	(43.51)	(38.43)
UWF	-14.99	7.351	-17.38	228.1***	-30.49	58.95	-55.69*	11.73	-37.64	92.39	-29.94	26.63
	(27.90)	(72.66)	(29.41)	(68.41)	(22.94)	(59.14)	(32.40)	(49.57)	(28.40)	(73.46)	(29.04)	(46.31)
UCF	-33.50	44.97	-76.59***	51.43	-19.37	47.61	-32.37	48.23*	-63.94**	46.93	-22.71	-5.225
	(24.14)	(34.73)	(26.21)	(49.86)	(24.27)	(46.26)	(31.11)	(28.74)	(28.06)	(41.98)	(29.75)	(34.31)
FGCU	-41.83	-52.62	-134.5***	-30.09	-69.36**	2.123	-65.77**	-54.83	-132.0***	-38.57	-52.87*	-38.83
	(30.12)	(62.86)	(35.13)	(67.38)	(34.73)	(52.61)	(32.24)	(44.86)	(43.54)	(55.69)	(31.87)	(41.20)
UF	28.81	7.259	70.56	9.284	8.472	7.148	11.26	-51.04	67.83**	26.61	-7.566	-41.80
	(31.39)	(79.38)	(52.88)	(49.55)	(23.13)	(61.94)	(30.91)	(67.07)	(31.03)	(43.04)	(31.93)	(43.58)
Chipola	0	443.5***			-11.70	365.0***	0	307.6***			-28.96	172.4***
	(0)	(28.92)			(35.94)	(40.11)	(0)	(26.47)			(50.28)	(28.51)
USF	-24.28	27.43	-49.66*	-4.230	-2.527	60.76	-35.27	35.42	-44.01	9.251	6.997	1.062
	(28.07)	(33.64)	(28.87)	(47.57)	(27.04)	(44.07)	(29.25)	(27.52)	(29.84)	(41.23)	(33.00)	(32.39)
UNF	21.82	63.57*	-97.80**	5.411	-11.74	29.69	-3.727	54.00	-55.99	40.99	-24.10	-29.75
	(28.73)	(37.12)	(47.17)	(59.68)	(25.24)	(48.61)	(30.65)	(35.91)	(40.48)	(56.43)	(29.85)	(35.95)
FSU	-23.04	97.31***	3.843	76.30	-41.64	106.6**	-40.25	103.8***	-12.12	94.95**	-31.51	42.97
	(28.18)	(36.74)	(49.10)	(47.95)	(26.68)	(43.39)	(29.63)	(29.04)	(52.85)	(42.33)	(30.93)	(31.53)
FAMU	-27.00	26.87	-77.61***	101.2*	-41.33	68.16	-58.87**	32.65	-43.93	52.70	-20.76	-6.321
	(33.85)	(49.49)	(19.23)	(55.92)	(32.43)	(52.43)	(29.43)	(42.84)	(32.29)	(43.22)	(37.50)	(41.67)
St. Pete Coll	105.8	-255.0***	-28.09	-378.2	-2.734	-44.42	12.74	-173.7**	-98.93*	-285.3***	-20.46	-139.8**
	(74.01)	(61.05)	(57.20)	(253.3)	(59.33)	(75.30)	(54.45)	(80.43)	(50.27)	(41.23)	(42.58)	(58.26)
New College	0	0	0	0	0	0	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Miami			0	-378.9***					0	-407.4***		
			(0)	(42.62)					(0)	(37.39)		
N	5210	9517	4516	9742	13094	21108	5289	8756	4253	8203	12854	18902
R^2	0.053	0.112	0.120	0.081	0.055	0.038	0.071	0.109	0.120	0.084	0.074	0.044

Table 8. Male pupil academic achievement and teacher preparation program effects (unadjusted): high school

	Male						Female					
	African American		Hispanic		White		African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading
FIU	-77.63*	16.87	-6.687	78.07*	-53.57	47.98	-90.85**	21.87	-13.03	8.220	-30.20	61.72
	(43.12)	(42.23)	(38.55)	(43.27)	(42.95)	(61.98)	(35.13)	(36.19)	(33.64)	(37.90)	(36.93)	(57.80)
UWF	-29.26	-121.0	-67.86	144.2*	-33.78	-11.37	-96.26*	-55.11	-91.80	86.87	-47.08	53.11
	(83.04)	(91.43)	(42.22)	(76.20)	(43.76)	(85.71)	(55.89)	(73.75)	(57.04)	(76.02)	(40.20)	(84.92)
UCF	-5.768	72.15**	-11.91	107.3***	-4.231	81.13*	-29.63	65.44**	0.905	38.85	0.846	89.20**
	(37.39)	(28.06)	(41.36)	(38.95)	(25.52)	(42.41)	(23.88)	(26.08)	(36.35)	(36.05)	(25.26)	(44.86)
FGCU	-9.474	43.61	-28.07	-2.114	-59.49**	15.00	-84.48***	34.36	-43.93	-14.04	-55.96**	66.83
	(41.97)	(63.36)	(45.76)	(62.05)	(29.79)	(93.70)	(31.90)	(53.14)	(42.71)	(65.96)	(27.78)	(90.23)
UF	-109.2	-21.01	36.93	9.187	-83.30**	-113.5*	-128.8**	-3.712	38.51	-15.75	-110.3***	-68.53
	(69.11)	(71.35)	(42.34)	(41.98)	(38.90)	(63.54)	(52.53)	(49.97)	(34.15)	(44.46)	(34.45)	(47.73)
USF	23.53	70.32***	16.26	99.82***	0.163	78.59*	-42.56*	68.49***	13.16	10.58	-10.96	93.44**
	(36.13)	(26.26)	(38.03)	(35.64)	(23.72)	(40.66)	(23.04)	(24.15)	(34.26)	(33.17)	(24.00)	(44.24)
UNF	70.48*	76.93**	43.00	103.0**	60.47**	46.04	17.79	79.56**	28.54	23.06	36.57	43.23
	(40.24)	(38.89)	(39.77)	(46.97)	(27.40)	(46.82)	(31.15)	(32.08)	(33.06)	(40.72)	(27.13)	(47.16)
FSU	28.38	147.1***	12.37	207.9***	14.69	148.4***	-20.39	145.5***	19.72	123.4***	11.56	146.8***
	(36.75)	(26.16)	(45.84)	(40.29)	(26.20)	(41.36)	(24.38)	(24.55)	(36.17)	(37.03)	(26.18)	(44.89)
FAMU	11.92	-1.811	4.236	105.8**	-64.40	-25.89	12.16	3.662	31.89	12.37	-9.026	-16.82
	(56.59)	(37.51)	(44.14)	(46.54)	(41.92)	(52.46)	(26.46)	(37.11)	(31.89)	(54.70)	(23.08)	(52.47)
St. Petersburg	-61.00	-12.92	-32.14	-49.12	-72.43***	-60.56	-117.0***	-91.39	-55.97	-274.6***	-68.08***	-107.1*
	(38.52)	(73.80)	(37.68)	(32.54)	(26.67)	(49.86)	(25.48)	(112.9)	(35.09)	(31.34)	(26.30)	(63.48)
New College	0	0	0	0	0	0	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
N	7585	9611	9098	8440	17892	18894	7412	9394	8427	7731	16996	17037
R^2	0.108	0.077	0.063	0.093	0.112	0.087	0.113	0.082	0.080	0.093	0.117	0.075

Table 9a. FAMU Teacher preparation program effects, male elementary school pupils, 2000 – 2005

	African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading
growth	0.0352	0.0081	-0.0406	-0.0976	-0.0113	0.0098
	(0.0213)	(0.0413)	(0.0377)	(0.0612)	(0.0101)	(0.0379)
N	2314	6838	2277	6414	4455	13389
R^2	0.113	0.097	0.118	0.089	0.13	0.072
annual gain	22.08	24.28	-18.24	-39.07	-18.68	-9.043
	(20.13)	(16.71)	(26.78)	(24.43)	(15.25)	(13.35)
N	2314	6838	2277	6414	4455	13389
R^2	0.097	0.115	0.128	0.122	0.107	0.078
lagged dep var	-0.232	22.61	-17.57	-2.576	-6.337	-13.02
	(22.80)	(14.30)	(20.33)	(28.93)	(18.19)	(16.46)
N	2314	6838	2277	6414	4455	13389
R^2	0.586	0.57	0.662	0.628	0.68	0.632
inst. variable	-56.21**	24.16	0	-122.1	0	-86.17***
	(27.40)	(28.35)	0.00	(118.80)	0.00	(20.46)
N	1527	4136	1635	3914	3081	8284
R^2	0.495	0.508	0.57	0.577	0.619	0.577
imputed coef.	6.785	23.29	-17.71	-15.54	-12.18	-10.77
	(21.25)	(14.41)	(21.00)	(24.75)	(16.62)	(13.40)
N	2314	6838	2277	6414	4455	13389
R^2	0.074	0.077	0.12	0.082	0.089	0.052

Table 9b. FAMU Teacher preparation program effects, female elementary school pupils, 2000 – 2005

	African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading
growth	0.0111	0.0420	0.0319	-0.0969	0.0014	-0.0197
	(0.0262)	(0.0377)	(0.0289)	(0.0610)	(0.0123)	(0.0239)
N	2178	6533	2199	5819	3989	12420
R^2	0.124	0.112	0.123	0.083	0.15	0.108
annual gain	-17.46	24.28	7.876	-58.20**	2.878	-38.31
	(28.47)	(16.46)	(24.71)	(27.43)	(18.26)	(23.42)
N	2178	6533	2199	5819	3989	12420
R^2	0.118	0.137	0.125	0.146	0.13	0.098
lagged dep var	-54.81**	15.98	-10.87	-41.63**	14.79	-41.96**
	(22.83)	(12.87)	(23.08)	(18.86)	(21.04)	(16.43)
N	2178	6534	2199	5819	3989	12420
R^2	0.601	0.603	0.654	0.655	0.7	0.632
inst. variable	-189.5**	-0.483	0	-21.22	20.28	-112.1***
	(75.52)	(25.67)	0.00	(33.91)	(47.89)	(22.20)
N	1413	3897	1569	3468	2811	7584
R^2	0.532	0.554	0.566	0.607	0.624	0.593
imputed coef.	-42.66*	19.14	-7.356	-47.13**	9.903	-39.52**
	(24.08)	(12.86)	(23.00)	(19.83)	(19.59)	(19.45)
N	2178	6535	2199	5819	3989	12420
R^2	0.088	0.085	0.102	0.089	0.112	0.066

Table 10a. FAMU Teacher preparation program effects, male middle school pupils, 2000 – 2005

	African American		Hispanic		White	
	Math	Reading	Math		Math	Reading
growth	-0.0154	-0.0447***	0.0064	-0.0060	0.0194**	-0.0129
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)
N	2595	4715	2577	4920	6731	11047
R^2	0.043	0.052	0.109	0.081	0.059	0.057
annual gain	-13.27	-38.09***	23.73	-12.56	30.32**	-5.229
	(16.93)	(14.05)	(16.44)	(13.48)	(11.78)	(13.68)
N	2596	4717	2577	4919	6731	11046
R^2	0.038	0.042	0.088	0.048	0.046	0.038
lagged dep var	-19.16	-3.661	13.21	5.02	19.5	3.092
	(18.06)	(15.68)	(12.72)	(14.79)	(11.81)	(14.35)
N	2596	4716	2577	4920	6731	11047
R^2	0.529	0.595	0.616	0.646	0.634	0.611
inst. variable	-112.8	26.64	-1.348	36.8	-23.24	-1.377
	(72.86)	(21.98)	(27.18)	(52.61)	(35.19)	(17.49)
N	2047	3634	2137	3859	5675	8980
R^2	0.523	0.59	0.607	0.623	0.608	0.576
imputed coef.	-17.39	-18.38	15.64	-0.782	24.11**	-0.831
	(17.37)	(12.84)	(13.00)	(12.72)	(10.77)	(12.45)
N	2595	4715	2577	4920	6731	11047
R^2	0.049	0.073	0.057	0.066	0.025	0.028

Table 10b. FAMU Teacher preparation program effects, female middle school pupils, 2000 – 2005

	African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading
growth	-0.0194	-0.0186	0.0106	-0.0053	-0.0072	-0.0218**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
N	2705	4618	2531	4357	6665	10139
R^2	0.060	0.065	0.111	0.079	0.045	0.044
annual gain	-27.68	-9.170	32.80*	6.832	-5.477	-22.75*
	(19.70)	(15.68)	(19.69)	(14.67)	(11.57)	(11.83)
N	2705	4617	2531	4357	6665	10139
R^2	0.039	0.040	0.093	0.051	0.029	0.026
lagged dep var	-32.73*	14.42	21.94	4.538	-7.267	-11.62
	(17.61)	(17.39)	(14.57)	(21.63)	(13.36)	(11.73)
N	2705	4618	2531	4355	6665	10139
R^2	0.575	0.612	0.647	0.66	0.662	0.632
inst. variable	-63.16**	33.46	109.0***	66.4	1.197	-1.244
	(25.64)	(20.87)	(40.71)	(42.42)	(17.23)	(19.75)
N	2144	3608	2082	3421	5601	8276
R^2	0.563	0.593	0.626	0.631	0.632	0.613
imputed coef.	-31.53*	3.733	24.72**	5.442	-6.593	-16.51*
	(17.78)	(15.56)	(12.17)	(19.56)	(12.26)	(9.19)
N	2705	4617	2531	4356	6665	10139
R^2	0.038	0.048	0.053	0.072	0.027	0.038

Table 11a. FAMU Teacher preparation program effects, male high school pupils, 2000 – 2005

	African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading
growth	0.0016	0.0125	0.0289***	0.0651***	-0.0040	0.0078
	(0.0067	(0.0124)	(0.0090)	(0.0182)	(0.0059)	(0.0226)
N	4065	4924	5167	5197	10194	10028
R^2	0.062	0.044	0.046	0.042	0.037	0.037
annual gain	5.931	12.6	40.98***	85.53***	-6.726	-2.529
	(9.269)	(14.44)	(13.68)	(18.96)	(7.651)	(37.49)
N	4065	4922	5167	5200	10194	10027
R^2	0.048	0.054	0.042	0.051	0.027	0.039
lagged dep var	-0.0449	-8.042	30.86	60.02***	-27.30***	-0.715
	(11.78)	(12.75)	(25.69)	(19.34)	(7.08)	(31.72)
N	4065	4919	5167	5198	10192	10025
R^2	0.579	0.524	0.635	0.55	0.701	0.571
inst. variable	9.669	-47.58	28.32	16.4	-12.59	-41.49
	(15.76)	(29.62)	(26.38)	(51.08)	(21.37)	(92.79)
N	3330	3879	4133	4473	8299	8281
R^2	0.529	0.518	0.58	0.514	0.66	0.567
imputed coef.	0.0849	-0.524	31.73	66.98***	-24.61***	-1.557
	(11.62)	(12.32)	(24.34)	(16.26)	(6.44)	(33.72)
N	4065	4925	5167	5203	10193	10026
R^2	0.105	0.105	0.104	0.101	0.076	0.071

Table 11b. FAMU Teacher preparation program effects, female high school pupils, 2000 – 2005

	African American		Hispanic		White	
	Math	Reading	Math	Reading	Math	Reading
growth	-0.0030	-0.0041	0.0062	0.0137	0.0088**	0.0007
	(0.0078)	(0.0104)	(0.0086)	(0.0136)	(0.0044)	(0.0155)
N	4324	5093	5032	5166	9924	9058
R^2	0.073	0.059	0.058	0.063	0.053	0.059
annual gain	-1.111	-1.82	13.24	30.14	12.32	7.399
	(9.333)	(14.89)	(12.80)	(20.33)	(7.473)	(25.04)
N	4324	5098	5032	5169	9924	9058
R^2	0.059	0.071	0.054	0.071	0.042	0.044
lagged dep var	0.739	-9.677	23.51	27.89	-6.171	4.218
	(8.648)	(14.85)	(15.71)	(22.25)	(5.449)	(27.0)
N	4323	5095	5032	5164	9923	9058
R^2	0.635	0.57	0.656	0.595	0.734	0.604
inst. variable	9.34	-31.44	-8.383	41.5	-22.54	-11.82
	(14.92)	(32.32)	(21.39)	(36.38)	(25.09)	(32.18)
N	3639	4006	4080	4389	8118	7625
R^2	0.572	0.535	0.62	0.553	0.711	0.591
imputed coef.	0.722	-7.189	22.48	28.34	-3.152	5.709
	(8.653)	(14.36)	(15.20)	(21.13)	(4.309)	(25.05)
N	4324	5095	5032	5169	9925	9059
R^2	0.103	0.11	0.093	0.133	0.089	0.06

Appendix

	EPI Training Offered			
Institution	**Professional Development**	**Substitute Teaching**	**Paraprofessional Training**	**Alternative Certification**
Brevard Community College	X	X	X	X
Broward College	X	X	X	X
Central Florida Community College	X	X	X	X
*Chipola College			X	X
Daytona State College				X
Florida Atlantic University	X			
Florida State College at Jacksonville	X	X	X	X
Florida Gulf Coast University				X
Florida Keys Community College				X
Gulf Coast Community College				X
Hillsborough Community College	X			X
Indian River State College	X	X	X	X
Lake City Community College	X	X	X	X
Lake Sumter Community College	X		X	X
Miami Dade College	X	X	X	X
North Florida Community College	X	X	X	X
Palm Beach State College	X	X	X	X
Pasco-Hernando Community College	X	X	X	X
Pensacola Junior College	X	X	X	X
Polk State College	X	X	X	X
Santa Fe College	X	X	X	X
Seminole State College				X
South Florida Community College	X			X
St. Johns River Community College	X	X		X
*St. Petersburg College	X		X	X
State College of Florida, Manatee-Sarasota	X	X	X	X
Teacher Education University	X			X
University of Florida				X
University of North Florida				X
University of West Florida				X
Valenica Community College	X	X	X	X

*EPI teacher preparation is based on a credit model at Chipola College and St. Petersburg College.

Source: Florida Department of Education, Bureau of Educator Recruitment, Development and Retention, April 22, 2010. http://www.teachinflorida.com/Preparation/EducatorPreparationInstitutes/tabid/187/Default.aspx